NITRATE DESERT

A CHILEAN ENTERPRISE IN WHICH $100,000,000 IS INVESTED.

LABORATORY OF THE GODS

HOW NITRATE IS MINED, WHAT IT COSTS, THE PROFITS.

Extent of the Deposits From Which Chile Gets Half Her Revenue—The Cities of the Desert or Nitrate Towns and Their Peculiar Features.

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IQUIQUE, CHILE, July 14.—For the past three weeks I have been traveling through a vast chemical laboratory of the gods. I have ridden over miles of plains covered with salt, have visited lakes of the whitest borax, have wound in and out among mountains rich in tin, copper and silver, and now write almost in the midst of the vast nitrate fields of Chile like unto which there is nothing on the face of the earth.

From Bolivia to the Sea.

Leaving the silver mining town of Oruro, Bolivia, I came down the mountains on the little narrow gauge which connects that town with the seaport of Antofagasta. The distance is 600 miles, or about as great as that between New York and Cleveland. The track is only two feet six inches wide, and the road is, I believe, the longest one of this gauge in the world. The cars are of the American style, having been built in Massachusetts. The seats on one side of the car are not wider than a kitchen chair, and on the other, where they are supposed to hold two, not more than thirty inches. It was, in fact, more like riding in a toy car than on the through trunk line which forms the only rail connection between two great countries. Still, the road is smooth and well laid. Its ties are of Oregon pine and the stations upon it are, as a rule, built of corrugated iron from Europe. The fares are exceedingly high. I paid 51 silver dollars for my ticket, and, in addition, $36 extra baggage, as nothing whatever is allowed free. My meals at the dining stations each cost me $1.50 in silver, and when I stopped at night, as I was forced to do twice on the road, the hotel rates were $4 per day. The chief purpose of the road is to carry the silver and other metals to the seacoast. The most of the cars of our train were loaded with little chunks of silver ore, and we passed trainloads of tin on its way to the Pacific.

The Salt Plains of Bolivia.

It was a ride through a desert. Shortly after leaving Oruro we entered the salt plains of Bolivia. These are of vast extent, lining the road for hundreds of miles. In fact there are but few places between Oruro and the sea where the ground is not more or less mixed with salt, and in some districts it covers the land like a sheet of dirty white snow. Along some parts of the line it looks hard and icy, and you feel like jumping off the cars for a skate. At others it lies in gullies and again it only sprinkles the ground and a ragged growth of scrubby vegetation struggles up through it. The road runs for nearly the whole of its length through a desert valley, and this salt reaches away on each side to the hills. Here and there along the road are lakes upon which seem to be floating great cakes of ice. The cakes are not ice, however. They are borax, and in the great borax lake of Ascotan, Bolivia, there is enough borax to wash the heads of all humanity. This lake has, it is estimated, more than 100,000 tons of pure borax ready to be shipped to the markets of the world. I saw it on my left as I rode over the railroad on the way to the coast. It is about six miles square, and the borax in it lies in great masses, which, when taken out, look for all the world like the finest pure white spun silk wadded up or woven into lumps. The stuff is borax of lime, and is not so good, I am told, as the borax that comes from similar lakes in California. Still it is of considerable value, for the lake has just been sold to a syndicate of Germans for £90,000.

A Desert Paved With Gold.

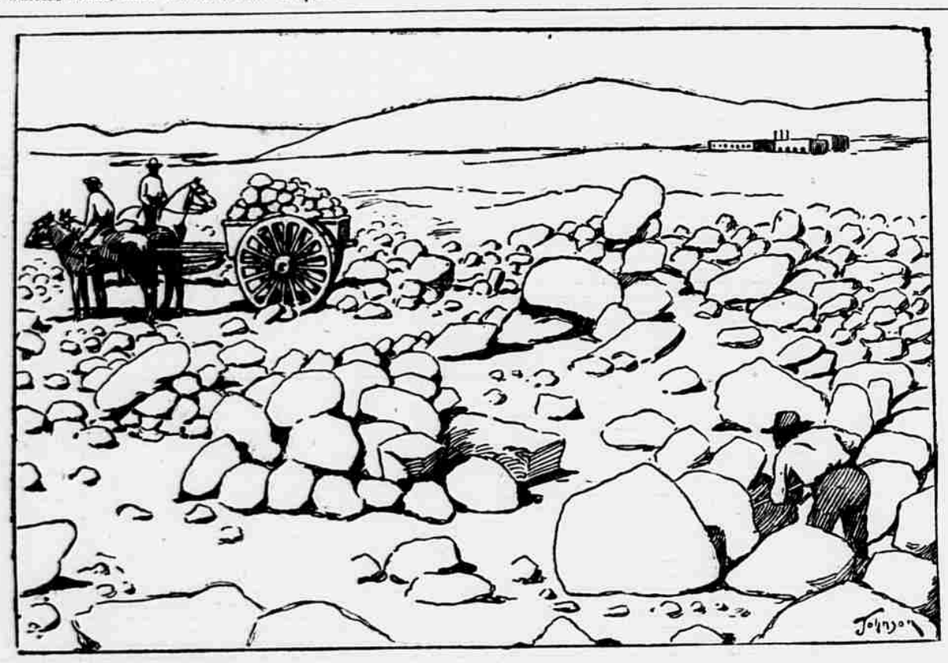
This lake, however, is not a drop in the ocean compared with the enormous value of the nitrate fields through which I crossed as I neared the Pacific. These fields extend north and south through this part of Chile for a distance of more than 300 miles, and their product is so valuable that they almost pave the desert of Chile with gold. They have produced millions upon millions of tons of nitrate of soda, and it is estimated that more than 1,200,000 tons of nitrate will be shipped from them this year. The value of these nitrate deposits runs high into the millions of dollars. When they were in the hands of the Peruvians they were rich, and now that they belong to Chile as a result of her war with Peru, she gets more than half her revenue from the export duty which she collects from them. The working of the fields is in the hands of foreigners, and more than $100,000,000 worth of English capital is invested in the great oficinas or factories by means of which the nitrate is taken from the earth and prepared for the markets of the world. Vast fortunes have been made out of these nitrate fields. I met in England some years ago the late Colonel North, the nitrate king, and visited him at his magnificent country place at Eltham, near London. He lived there like a prince and was at the time fairly rolling in wealth. All of his money was made in this region, and the champagne which we had at dinner, though its taste showed no evidence of the fact, was effervescent with nitrate of soda. The nitrate which the United States imported from this Iquique district alone in 1897 cost more than $3,000,000 in gold, and the amount was more than 234,000,000 pounds.

The greater part of this has gone into the making of powder and high explosives, and much of it has already been used in the war with Spain. Another part of it has been sold as fertilizers, and is now enriching the soil of American farms. It is as a fertilizer that the chief demand for the nitrate comes, the bulk of the product going to Germany, where it is used in the growing of the sugar beet. Just now, however, the nitrate business is not as prosperous as it has been. A number of the factories are idle, and the markets are overstocked.

In the Nitrate Fields.

My first view of the nitrate fields was on the railroad going to Antofagasta. The deposits in that part of Chile, however, are not so good as those further north, and I have taken ship and come to Iquique, which is the chief shipping port of the best nitrate fields of the world. I have traveled from here to some of the richest fields and have spent a day at the great nitrate oficina of the Agua Santa Company, which has a capital of $3,000,000 and which produces millions of pounds of nitrate a month. But before I describe the method of getting this product out of the earth, let me show you where these wonderful fields are. In the first place, the word field is misleading. It conveys the idea of fences and fixed boundaries. The nitrate fields are scattered over the desert, and their only boundaries are white posts at the corners of the different properties. There is not enough waste wood in the whole desert to make a line fence about a city lot.

There is not a blade of grass, and with the exception of here and there a scrubby tree, all is bare, gray, desolate sand, with here and there a glint of white where the salt rock has caught the rays of the sun. There are few more barren places in the world than the Chilean desert. The coasts of the upper part of the country are as bleak as the most barren parts of the Rocky mountains, and this sand and rock extend inland almost to the tops of the Andes. Along the coast there is a low range of foot hills rising in places to the height of a mile and more above the sea. Beyond this there is a rolling valley which runs from north to south, and on the other side of this valley the foothills of the Andes begin. It is along the western edge of this valley that the nitrate is found. In some places it is not more than fifteen miles and in others as far as ninety miles from the sea, but the deposits all lie along the western edge of the valley, forming a strip of an average width of a mile and running irregularly, as I have said, from north to south for a distance of more than 300 miles. In some places the deposit is four miles wide, and in others it plays out altogether and crops out some distance further on. In some fields the nitrate rock lies on the top of the ground. In others it is found from thirty to forty feet below the surface, with a strata of salt rock on top of it. The nitrate itself is seldom found pure in nature, though much of the rock contains from 40 to 60 per cent of nitrate.



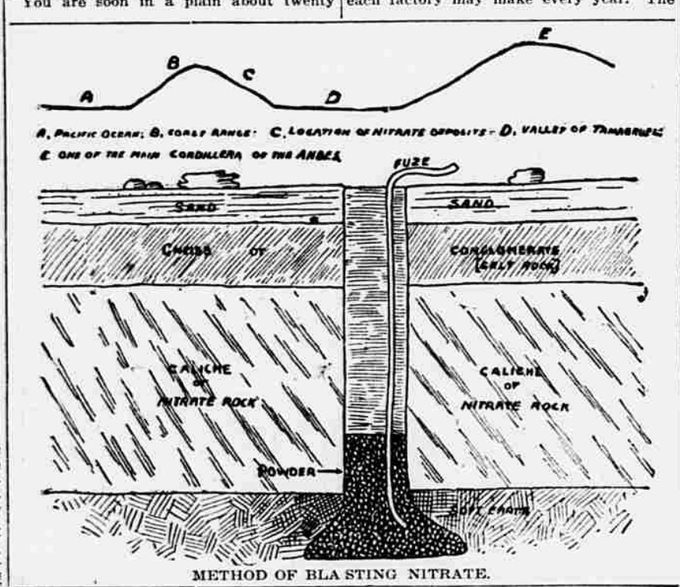
LOADING NITRATE.

The Antofagusta rock does not contain more than 14 per cent of nitrate, and other fields vary with the nature of the deposit. It is the getting of the nitrate rock out of the earth and the extracting the pure nitrate salts from it that constitutes the immense industry of the pampas or nitrate fields. As to where the nitrate comes from there are a number of theories. One is that the desert was once the bed of an inland sea, and that the nitrate came from the decaying of the nitrogenous seaweed. Another theory is that the ammonia rising from the vast beds of guano on the islands off the coast was carried by the winds over the range of hills near the sea and there condensed, settled and united with other chemicals of the soil to form the deposits, and still a third is that the electrical discharges of the Andes combine with the elements of the air to make nitric acid. This acid was carried down through the ages in the floods of the Andes and was deposited on these beds in the form of nitrate of soda. None of these theories is entirely satisfactory, and as yet no one has absolutely solved the problem as to whence the nitrate comes.

How Nitrate Is Mined.

We shall see how nitrate is mined by a visit to the great pampa of Tamrugal. This pampa or field has sixty miles of oficinas and nitrate fields. A railroad has been built through it to carry the nitrate to the seacoast at Iquique, and upon it has grown up vast factories, towns of corrugated iron huts, in which the tens of thousands of workmen employed in the business live, and the homes of the scores of well educated Europeans who live here and manage the properties. Leaving Iquique the railroad carries you up the hills and brings you right into the nitrate fields.

You are soon in a plain about twenty miles wide, with low hills rising upward on the right and the left. On the side of this plain nearest the sea the earth looks as though it had been plowed by giants, and it lies in mammoth clods of all shapes and sizes. This is the nitrate fields which have been or are being worked. The rest of the land is bleak, bare sand. There is no vegetation and no sign of life of any kind. All is sand, salt rock and amid the clods nitrate rock which is called caliche. It is a soluble rock of different colors. In some places it is almost white and looks like rock salt. In others it is yellow, and in others all shades of gray, lemon, violet and green. The strata of nitrate usually lies two feet or more under the earth, and there is often a salt rock or conglomerate above it. The method of getting it out is to bore a round hole about a foot in diameter through the upper crust and to extend it down for a few inches into the soft earth below it. Now into this hole a boy is let down. He scoops out a pocket for the blasting powder and arranges the fuse. He is then pulled out and the fuse is lighted. An explosion follows. A great yellow cloud of smoke and dust goes up into the air and the earth is broken up for a radius of about thirty feet about the hole. The nitrate rock is now dug off with picks and crowbars. It is broken into pieces of thirty pounds or less and is loaded upon iron carts to be taken to the factory. Each of these carts will hold three tons of rock and each is hauled by three mules, the driver sitting upon one of the animals.



METHOD OF BLASTING NITRATE.

At the Factory.

The caliche or nitrate rock is taken in these carts from the fields to the oficina or factory. This usually stands in the midst of the fields. It is a collection of buildings with great smokestacks rising above them. It contains thousands of dollars' worth of costly machinery, vast tanks for boiling the nitrate rock, crushers like those of a smelter to break it to pieces and settling vats in which the liquid containing the pure nitrate of soda is left until it has dropped its burden of valuable salt. The nitrate rock of the Agua Santa fields as we saw it blasted out of the earth has only about 40 per cent of nitrate of soda in it. The nitrate sent to the markets is from 95 to 96 per cent pure, and the rock must be so treated as to bring about this result. This is done by boiling the rock just so much and no more. The crushers reduce the caliche to pieces about two inches thick, and it is then taken to the boiling tanks, which are situated in a building perhaps fifty feet above the ground. These tanks are each big enough to form a bath tub for an elephant. They are twenty-four feet long, nine feet wide and eight feet deep. In them there are coils of pipe into which steam is running, raising the temperature of the fluid in the tank to any desired point.

The caliche is carried in cars up an inclined railway and dumped into the tanks. Then water is admitted and is allowed to flow from tank to tank in such a way as to act to the best advantage on the salts within. The nitrate of soda will remain in solution at a lower temperature than other salts. This fact and others of a scientific nature are taken advantage of, everything being done with the greatest care, and the result is that when the liquor is drawn off nearly all of the pure nitrate of soda in the rock goes with it. It flows from the boiling tanks into other tanks, which lie in the open air at a lower level. It now looks for all the world like pale maple molasses or thick lemon syrup. In a short time it begins to crystallize and the tank is half sugar, which is really almost pure nitrate of soda. This is now shoveled into piles, whence it is bagged up in sacks of 300 pounds each and hauled on the railroad to the seacoast, to be shipped off to the United States or to Europe.

A Lesson in Economy.

After the salts have settled in the tanks the liquor which lies on top still contains a large amount of nitrate. It is conveyed back to the boiling tanks and is loaded with ore nitrate by being flowed over the fresh rock. I shall not describe the technical details of the process, which is complicated in the extreme. They were explained to me by Mr. James T. Humberstone, the manager of the Agua Santa Oficina, the man who is perhaps of all the nitrate managers the best posted upon such matters. I will only say that the greatest care is taken to get every atom of nitrate out of the rock at the lowest possible cost, and that I was again and again surprised at the careful study which has been taken to save every cent in product and labor throughout the works. It was indeed a lesson in economy, and when I referred to it, Mr. Humberstone said: "The nitrate profits of to-day are a question of small savings. We make so much that the difference of a cent in the cost of a quintal, or 100 pounds, is an important item. It would, in fact, mean to us a saving of at least $1,200 a month." Mr. Humberstone also showed me how the iodine of commerce is made from this nitrate liquor. It is an element separate and apart from the nitrate of soda and it forms another valuable product of the nitrate fields. It is precipitated in tanks by means of bisulphite of soda, and is drawn off in the shape of a dirty black powder. The powder is washed and filtered and is then put into iron retorts and heated. It soon turns to vapor, which is conducted into pipes of fireclay, in which as it cools it changes into crystals of a beautiful violet color. These are packed up and shipped to our country and to Europe. The sale of iodine is a monopoly in the hands of Anthony Gibbs & Co., of London. The different companies have formed a trust which controls the product of the world and dictates just how much each factory may make every year. The price is now, I am told, 8 pence per ounce.

What It Costs to Make Nitrate.

People who think that money is easily made in nitrate are much mistaken. The business requires large capital and the most careful management. The prices of nitrate lands have steadily risen of late years and to-day the only properties to be gotten outside of those in the hands of the seventy-nine factories which are now in existence are from the Chilean government, which only sells at auctions, which are periodically held. The last auction was held in 1894, when 2,000 acres were appraised at $3,500,000, and sold, I believe, for more than their appraisement. Another property was appraised at $9,500,000 of our money. There is a limited demand for nitrate of soda, and while it is believed that the amount in sight will last the world at the present rate for fifty years and more, the Chilean government is anxious not to ruin the business out of which it gets so great a revenue by throwing more lands just now on the markets. Even after the land is bought it costs an enormous amount to establish a nitrate factory. Take that of Agua Santa. It has a capital of $3,000,000 in gold, and it pays dividends of 10 per cent, or $300,000 a year. The factory alone cost $655,000, and in addition there has been put in a Westinghouse electric plant at a cost of $156,000 more. It has buildings which cost $212,000, and its water supply cost $51,000. It is now employing 800 hands, who receive $60,000 a month, and it supports about the works a colony of more than 3,000 souls. It owns a railroad to the seaport of Caleta Buena, which port also belongs to it, and from which it ships its nitrate. Like all of the factories, it has a large store connected with the works and a great part of the wages of the men are spent upon the ground.

Cities in the Desert.

This is only one of the great establishments which the nitrate rock has built in a desert. It has built numerous other factories and it is now keeping tens of thousands of men at work. All along the nitrate railroad there are towns containing houses of corrugated iron, with hotels and stores, and at the seacoast, which is, if anything, more barren and desert-like than the nitrate fields themselves, there are a number of thriving cities, all of which depend entirely upon these nitrate deposits. Take Iquique, for instance. It lies on the edge of the sea, right under the ragged hills which fringe the coast. There is not a blade of grass about it, and not a drop of water, save that which is brought here in ships or in the iron pipe line, seventy-five miles long, with which it has been connected with the springs of Pica, in the interior. Still, Iquique has 30,000 people, and, next to Valparaiso, it is the most thriving seaport in Chile. It has wide streets, telephones and electric lights, and a street car line, with Chilean maidens as conductors. It has newspapers, a theater and as good an English club as you will find along the west coast of South America. It has good stores and markets, and though it produces almost nothing but nitrate of soda, it has everything from the outside, and you can live as well here and have as great a variety of eating as any place in South America. Antofagasta, though not as large as Iquique, is almost equally well favored, and there are a half dozen other ports here in the desert which are nourished by the business of making and shipping nitrate of soda.

FRANK G. CARPENTER.

DISEASES THAT ATTACK DIVERS

Work at Depths Below 150 Feet Brings on Paralysis—Hemorrhage Also Experienced.

From the London Lancet.

An interesting case of divers' paralysis is reported from Guy's hospital. The patient was working with five other men at a depth of 162 feet and went down three times, remaining below twenty minutes each time; the ascent occupied six minutes. He felt quite well after these descents, but at the fourth descent a heavy piece of machinery slipped and jammed him up against an iron beam. He did not lose consciousness, but tried to economize the air at his disposal. After about five minutes he felt suffocated, had intense pain and noises in the head, and began to lose consciousness. It had been noticed on the lighter that the air tube was not working, and another diver went down and by following the line reached the patient and freed the air tubes so that he could be drawn up. On this occasion the ascent occupied only one minute. He felt giddy and sick, but did not notice anything else amiss. On standing he noticed a feeling of numbness in his feet, and this was present also in his arms, both as to power and sensation. On admission to the hospital nine weeks afterward there was marked loss of power in both his legs. There was no marked wasting of the muscles of the legs, though they were soft and flabby. The knee jerks were normal. There was partial anaesthesia over the inner side of both legs from three inches above the knee to three inches above the ankles, the areas roughly symmetrical. There was no loss of sensation to pain; the sensations to heat and cold were normal.

The patient, who had had three previous attacks, gave some interesting information as to the difficulties to which people engaged in this occupation are liable. He said that in his experience the paralysis only comes on after working at great depths and seems to be due to too sudden alteration of pressure. The disease is frequently due to divers having to be quickly hauled up, owing to the air tube being foul. Old men, he thought, are more liable to these attacks than younger ones, and the character of the water and the duration of the stay are not so important as the age of the diver. At a depth of 150 feet there was not much inconvenience, but every two or three feet lower makes a difference. When diving at great depths the men have a sense of fullness in the head, buzzing in the ears, and flashes of light before the eyes. On coming up there is often bleeding from the mouth, nose, and ears. The patient also referred to the condition known to the men as "bends"—that is, wrist-drop and foot-drop. This usually lasts from two hours to twenty-four hours, when it completely passes off, unless it is an exceptionally bad attack. This condition was ascribed by the patient to the bands applied round the ankles and wrists to make the diving suit water-tight.

"LONDINOPHOBIA."

Is the World's Metropolis a Good Place to Live In—Innumerable Menaces to Health.

A controversy is going on in the columns of the London Mail as to whether or not London is a desirable place to live. Many claim that it is the only place on earth where life is really worth living; a few who are afflicted with Londinophobia, savagely criticise the conditions which there prevail. Here is a specimen attack: Innumerable are the menaces to health. And, socially, what a pandemonium is here! At the top, gayety without enjoyment; at the bottom, misery without hope; and in the midst, a fearful battle for life among combatants (including even women and children) drawn from all parts of Great Britain, from all parts of the British empire, and even from all parts of the world. We all know now—thanks to Darwin and Spencer—that the struggle for existence is nature's universal curse from the microbe up to man; but it rages with particular ferocity in this London, the center of the universe, the modern "orbis terrarum." Strange it is, then, that anyone should live in such a place unless compelled by dire necessity, and stranger still that any one should praise it unless infatuated through excess of civic patriotism.

Names of Flowers.

The fuchsia was called after Leonard Fuchs, a famous German botanist.

The magnolia took its name from Pierre Magnol, an eminent writer on botanical subjects.

The dahlia was named in honor of Andrew Dahl, a Swedish botanist.

Lilac is from "lilaj," a Persian word signifying flower. The plant was introduced into Europe from Persia in the fifteenth century by a German traveler named Busbeck.

Tulip is derived from the Persian word "dulband," meaning turban. Busbeck, a German traveler, brought the first bulb to Europe in the sixteenth century.

Dandelion is from the French "dent de lion," "lion's tooth," and in nearly all languages it bears a similar name. The analogy that suggested this name becomes quite clear when we remember that the lion was the animal symbol of the sun. The yellow dandelion, with its golden rays, is a miniature representation of the sun, and, through association, its rays are identical with the lion's teeth.

There is a curious tradition to account for the wall flower that has been adopted by Herrick. In ancient days there was a castle near the River Tweed in which a maiden was imprisoned. She had given her love to the heir of a hostile clan, but, blood having been shed between the chiefs of the clans, the deadly hatred thus engendered forbade all thought of their union. The lover tried all sorts of stratagems to gain access to his sweetheart, and at last succeeded in gaining admission to the castle disguised as a wandering troubadour. He planned her escape and was to await her arrival with an armed force. The result we may tell in Herrick's words:

> Up she got upon a wall,
> Attempted to slide withal;
> But the silken twist untied,
> She fell, and, bruised, soon died.
> Love, in pity to the deed,
> And her loving, luckless speed,
> Twined her to this plant we call
> Now the "flower of the wall."

Embarrassing.

From the London Weekly Telegraph.

Mr. Peet, a very diffident man, was unable to prevent himself from being introduced one evening to a fascinating young lady, who, misunderstanding his name, constantly addressed him as Mr. Peters, much to the gentleman's distress. Finally summoning up the courage, he earnestly remonstrated, "Oh, don't call me Peters—call me Peet!"

"Ah, but I don't know you well enough, Mr. Peters," said the young lady, blushing, as she withdrew behind her fan.

Inquiring person—"What time did the hotel catch fire?" Fireman—"Midnight." Inquiring person—"Everybody get out safe?" Fireman—"All except the night watchman. They couldn't wake him up in time."—Tit-Bits.